REMARKS

Claims 1, 2, 4, and 7-12 are currently pending. Claims 1 and 4 are currently amended. Claims 6, 23, and 24 are cancelled and the rejections with regard to these claims are now moot. Claims 1, 2, 4, and 7-12 are currently rejected. The amendments to Claim 1 deleted text. Support for the amendments to Claim 4 can be found at, for example, paragraphs [0055] to [0061] and the sequence listing. The Applicants submit that the amendments place the claims in condition for allowance, or alternatively in better condition for appeal, and respectfully request entry of the Amendments.

Claim 4 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The rejection states that the recitation of a polynucleotide comprising from "about 2 to about 1589 of the nucleic acid sequence" renders Claim 4 indefinite.

Amended Claim 4 is not indefinite under 35 U.S.C. §112, second paragraph. Amended Claim 4 no longer recites "about 2 to about 1589 of the nucleic acid sequence[.]" Instead, amended Claim 4 now recites that the isolated nucleic acid molecule comprises "nucleic acid residues 45 to 1628 of the nucleic acid sequence contained in SEQ ID NO: 1." The Applicants submit that amended Claim 4 is definite under 35 U.S.C. §112, second paragraph, and it is now clear which nucleic acid residues in SEQ ID NO: 1 are being referred to. The Applicants respectfully request withdrawal of the rejection of Claim 4 under 35 U.S.C. §112, second paragraph.

Claims 1 and 7-12 have been rejected under 35 U.S.C. §112, first paragraph, as failing to satisfy the written description requirement. The rejection states that the written description requirement is not satisfied because these claims recite "a polynucleotide at least 90% identical" to a polynucleotide encoding SEQ ID NO: 2 or complements thereof.

Claim 1 has been amended. Amended Claim 1 no longer recites "a polynucleotide at least 90% identical" to the polynucleotide encoding SEQ ID NO: 2 or complements thereof. Claims 7-12 are dependent on amended Claim 1 and incorporate all the recitations of this claim. Consequently, these claims also do not recite "a polynucleotide at least 90% identical" to the polynucleotide encoding SEQ ID NO: 2 or complements thereof. The Applicants respectfully request withdrawal of the rejections of Claims 1 and 7-12 under 35 U.S.C. §112, first paragraph, as failing to satisfy the written description requirement.

Claims 4 is rejected under 35 U.S.C. §102(a) as being anticipated by Ota. The rejection states that Ota teaches a polynucleotide having Accession Number AX878198 that encodes amino acid residues 2 to 259 of SEQ ID NO: 2, polynucleotide subsequences thereof, and antisense oligonucleotides thereof.

Amended Claim 4 is not anticipated under 35 U.S.C. §102(a) by Ota. Amended Claim 4 is directed to "[a]n isolated nucleic acid molecule comprising nucleic acid residues 45 to 1628 of the nucleic acid sequence contained in SEQ ID NO: 1." First, the nucleic acid sequence disclosed in Ota with Accession Number AX878198 is not identical to residues 45 to 1628 of SEQ ID NO: 1 as assessed by aligning the two sequences using the CLUSTALW algorithm and the default settings for this algorithm. *See* Alignment 1 (attached). Second, the Ota nucleic acid sequence contains different nucleic acid residues at the aligned positions equivalent to positions 1180, 1202 and 1245 of SEQ ID NO: 1. Third, the nucleic acid sequence disclosed in Ota, in addition to being non-identical, only aligns to residues 1 to 1446 of SEQ ID NO: 1 and not to all of residues 45 to 1628 of SEQ ID NO: 1. Consequently, it is clear the nucleic acid sequence disclosed in Ota is different than SEQ ID NO: 1, does not describe all the elements of the claimed nucleic acid sequence, and does not describe a nucleic acid sequence identical to residues 45 to 1628 of SEQ ID NO: 1. Stated differently, the nucleic acid sequence disclosed in

Ota cannot anticipate the nucleic acid molecule of amended Claim 4, because Ota both fails to teach an identical nucleic acid sequence and fails to teach all the elements of the claimed nucleic acid molecule. The Applicants respectfully request withdrawal of the rejection of Claim 4 under 35 U.S.C. §102(a) as being anticipated by Ota.

Claim 4 is rejected under 35 U.S.C. §102(b) as being anticipated by Williams. The rejections states that William's teaches a 300 base polynucleotide having Accession Number AAA00789.

Claim 4 is not anticipated under 35 U.S.C. §102(b) by Williams. Amended Claim 4 is directed to nucleic acid molecules "comprising nucleic acid residues 45 to 1628 of the nucleic acid sequence contained in SEQ ID NO: 1." First, the nucleic acid sequence disclosed in Williams is not identical to nucleic acid residues 45 to 1628 of SEQ ID NO: 1 as assessed by alignment of these two sequences using the CLUSTALW algorithm and the default settings of the algorithm. *See* Alignment 2 (attached). Second, the Williams nucleic acid contains different nucleotide residues at the aligned positions equivalent to positions 938 and 1180 of SEQ ID NO: 1. Third, the Williams nucleic acid also contains an additional nucleotide residue at position 257 which shifts the reading frame of the Williams nucleic acid relative to SEQ ID NO: 1. Last, the Williams nucleic acid sequence is only 300 bases in length and corresponds just to residues 924 to 1222 of SEQ ID NO: 1 not the entire claimed nucleic acid molecule comprising nucleic acid resides 45 to 1628 of SEQ ID NO: 1. Consequently, it is clear the nucleic acid sequence disclosed in Williams is different than nucleic acid residues 45 to 1628 of SEQ ID NO: 1, and does not describe all the elements of the claimed nucleic acid sequence, and does not describe a nucleic acid sequence identical to residues 45 to 1628 of SEQ ID NO: 1. Stated differently, the nucleic acid sequence disclosed in Williams cannot anticipate the nucleic acid molecule of amended Claim 4, because Williams both fails to teach an identical nucleic acid sequence and fails to teach all elements of the claimed nucleic acid molecule. The Applicants respectfully request withdrawal of the rejection of amended Claim 4 under 35 U.S.C. §102(b) as being anticipated by Williams.

In light of the foregoing, the Applicants respectfully submit that the entire Application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,

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Attorney for Applicants

TDC/WPL/rb
(215) 656-3381

Alignment 1.apr

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                                                                                      Section 1
                                 (1) 1         ,10        20        ,30                      48
10-679,561 SEQ ID NO: 1          (1) ATCAGCGCTGGCGCGGCTGCGGCCGCTGCTGCCTACGCGCCATGGAGC
       AX878198 (Ota)            (1) ATCAGCGCTGGCGCGGCTGCGGCCGCTGCTGCCTACGCGCCATGGAGC
            Consensus            (1) ATCAGCGCTGGCGCGGCTGCGGCCGCTGCTGCCTACGCGCCATGGAGC
                                                                                      Section 2
                                (49) 49         ,60       ,70       ,80                      96
10-679,561 SEQ ID NO: 1         (49) ATCGCATCGTGGGGCCCGGGCCGTACCGAGCTACCAGGCTGTGGAATG
       AX878198 (Ota)           (49) ATCGCATCGTGGGGCCCGGGCCGTACCGAGCTACCAGGCTGTGGAATG
            Consensus           (49) ATCGCATCGTGGGGCCCGGGCCGTACCGAGCTACCAGGCTGTGGAATG
                                                                                      Section 3
                                (97) 97           ,110       ,120       ,130               144
10-679,561 SEQ ID NO: 1         (97) AGACCGTGGAGCTTTTTCGTGCTAAGATGCCGTTACGGAAACATCGCT
       AX878198 (Ota)           (97) AGACCGTGGAGCTTTTTCGTGCTAAGATGCCGTTACGGAAACATCGCT
            Consensus           (97) AGACCGTGGAGCTTTTTCGTGCTAAGATGCCGTTACGGAAACATCGCT
                                                                                      Section 4
                               (145) 145  ,150       ,160       ,170       ,180          192
10-679,561 SEQ ID NO: 1        (145) GTCGTTTCAAGAGCTATGAGCATTGTTTCACAGCGGCCGAAGCTGTGG
       AX878198 (Ota)          (145) GTCGTTTCAAGAGCTATGAGCATTGTTTCACAGCGGCCGAAGCTGTGG
            Consensus          (145) GTCGTTTCAAGAGCTATGAGCATTGTTTCACAGCGGCCGAAGCTGTGG
                                                                                      Section 5
                               (193) 193    200        210        220        230        240
10-679,561 SEQ ID NO: 1        (193) ATTGGCTGCATGAGCTGCTGAGGTGCAGTCAAAACTTCGGCCCTGAAG
       AX878198 (Ota)          (193) ATTGGCTGCATGAGCTGCTGAGGTGCAGTCAAAACTTCGGCCCTGAAG
            Consensus          (193) ATTGGCTGCATGAGCTGCTGAGGTGCAGTCAAAACTTCGGCCCTGAAG
                                                                                      Section 6
                               (241) 241       250        260        270                288
10-679,561 SEQ ID NO: 1        (241) TGACCCGCAAACAAACGGTCCAGCTGCTAAAAAAATTCCTGAAGAATC
       AX878198 (Ota)          (241) TGACCCGCAAACAAACGGTCCAGCTGCTAAAAAAATTCCTGAAGAATC
            Consensus          (241) TGACCCGCAAACAAACGGTCCAGCTGCTAAAAAAATTCCTGAAGAATC
                                                                                      Section 7
                               (289) 289        ,300       ,310       ,320              336
10-679,561 SEQ ID NO: 1        (289) ACGTTATTGAAGACATCAAGGGAAAATGGGGTGAGGAAGATTTTGAAG
       AX878198 (Ota)          (289) ACGTTATTGAAGACATCAAGGGAAAATGGGGTGAGGAAGATTTTGAAG
            Consensus          (289) ACGTTATTGAAGACATCAAGGGAAAATGGGGTGAGGAAGATTTTGAAG
                                                                                      Section 8
                               (337) 337          ,350       ,360       ,370              384
10-679,561 SEQ ID NO: 1        (337) ACAATCGTCACTTATACAGATTTCCTCCTTCTTCACCCCTGAAACCAT
       AX878198 (Ota)          (337) ACAATCGTCACTTATACAGATTTCCTCCTTCTTCACCCCTGAAACCAT
            Consensus          (337) ACAATCGTCACTTATACAGATTTCCTCCTTCTTCACCCCTGAAACCAT
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                                                                        Section 9
                         (385) 385  390          400          410          420          432
 10-679,561 SEQ ID NO: 1 (385) ATCCAAAGAAGCCCCCAAACCAAAAGGATGTTATTAAATTTCCAGAAT
        AX878198 (Ota)   (385) ATCCAAAGAAGCCCCCAAACCAAAAGGATGTTATTAAATTTCCAGAAT
              Consensus  (385) ATCCAAAGAAGCCCCCAAACCAAAAGGATGTTATTAAATTTCCAGAAT
                                                                        Section 10
                         (433) 433    440          450          460          470       480
 10-679,561 SEQ ID NO: 1 (433) GGAATGATCTCCCACCAGGCACTTCACAAGAGAACATCCCAGTGAGGC
        AX878198 (Ota)   (433) GGAATGATCTCCCACCAGGCACTTCACAAGAGAACATCCCAGTGAGGC
              Consensus  (433) GGAATGATCTCCCACCAGGCACTTCACAAGAGAACATCCCAGTGAGGC
                                                                        Section 11
                         (481) 481         490          500          510               528
 10-679,561 SEQ ID NO: 1 (481) CAGTTGTGATGAATTCTGAGATGTGGTACAAGCGTCACAGTATTGCAA
        AX878198 (Ota)   (481) CAGTTGTGATGAATTCTGAGATGTGGTACAAGCGTCACAGTATTGCAA
              Consensus  (481) CAGTTGTGATGAATTCTGAGATGTGGTACAAGCGTCACAGTATTGCAA
                                                                        Section 12
                         (529) 529         540          550          560               576
 10-679,561 SEQ ID NO: 1 (529) TTGGAGAGGTGCCAGCTTGCCGTCTTGTCCACCGCAGACAGCTGACAG
        AX878198 (Ota)   (529) TTGGAGAGGTGCCAGCTTGCCGTCTTGTCCACCGCAGACAGCTGACAG
              Consensus  (529) TTGGAGAGGTGCCAGCTTGCCGTCTTGTCCACCGCAGACAGCTGACAG
                                                                        Section 13
                         (577) 577               590          600          610       624
 10-679,561 SEQ ID NO: 1 (577) AGGCCAATGTAGAAGAGATATGGAAGTCTATGACATTATCATACTTAC
        AX878198 (Ota)   (577) AGGCCAATGTAGAAGAGATATGGAAGTCTATGACATTATCATACTTAC
              Consensus  (577) AGGCCAATGTAGAAGAGATATGGAAGTCTATGACATTATCATACTTAC
                                                                        Section 14
                         (625) 625  630          640          650          660          672
 10-679,561 SEQ ID NO: 1 (625) AGAAAATTCTTGGCCTGGATTCCTTAGAAGAAGTTTTAGACGTCAAAC
        AX878198 (Ota)   (625) AGAAAATTCTTGGCCTGGATTCCTTAGAAGAAGTTTTAGACGTCAAAC
              Consensus  (625) AGAAAATTCTTGGCCTGGATTCCTTAGAAGAAGTTTTAGACGTCAAAC
                                                                        Section 15
                         (673) 673    680          690          700          710       720
 10-679,561 SEQ ID NO: 1 (673) TTGTCAATTCGAAGTTCATCATCCATAATGTATATAGTGTTAGCAAGC
        AX878198 (Ota)   (673) TTGTCAATTCGAAGTTCATCATCCATAATGTATATAGTGTTAGCAAGC
              Consensus  (673) TTGTCAATTCGAAGTTCATCATCCATAATGTATATAGTGTTAGCAAGC
                                                                        Section 16
                         (721) 721         730          740          750               768
 10-679,561 SEQ ID NO: 1 (721) AGGGAGTTGTTATTCTTGATGACAAGTCAAAAGAACTTCCTCATTGGG
        AX878198 (Ota)   (721) AGGGAGTTGTTATTCTTGATGACAAGTCAAAAGAACTTCCTCATTGGG
              Consensus  (721) AGGGAGTTGTTATTCTTGATGACAAGTCAAAAGAACTTCCTCATTGGG
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                                                                        Section 17
                          (769) 769            780            790            800            816
10-679,561 SEQ ID NO: 1   (769) TGCTGTCAGCTATGAAGTGTTTGGCAAATTGGCCCAACTGTTCTGATT
       AX878198 (Ota)     (769) TGCTGTCAGCTATGAAGTGTTTGGCAAATTGGCCCAACTGTTCTGATT
            Consensus     (769) TGCTGTCAGCTATGAAGTGTTTGGCAAATTGGCCCAACTGTTCTGATT
                                                                        Section 18
                          (817) 817            830            840            850            864
10-679,561 SEQ ID NO: 1   (817) TGAAGCAGCCTATGTACTTGGGATTTGAAAAAGATGTCTGTAAAACCA
       AX878198 (Ota)     (817) TGAAGCAGCCTATGTACTTGGGATTTGAAAAAGATGTCTGTAAAACCA
            Consensus     (817) TGAAGCAGCCTATGTACTTGGGATTTGAAAAAGATGTCTGTAAAACCA
                                                                        Section 19
                          (865) 865  870           880            890            900            912
10-679,561 SEQ ID NO: 1   (865) TAGCTGATTACTATGGTCACTTGAAAGAGCCTCTACTTACATTTCATC
       AX878198 (Ota)     (865) TAGCTGATTACTATGGTCACTTGAAAGAGCCTCTACTTACATTTCATC
            Consensus     (865) TAGCTGATTACTATGGTCACTTGAAAGAGCCTCTACTTACATTTCATC
                                                                        Section 20
                          (913) 913     920            930            940            950          960
10-679,561 SEQ ID NO: 1   (913) TTTTTGATGCTTTTGTCAGTGTACTGGGTTTGTTACAGAAGGAGAAAG
       AX878198 (Ota)     (913) TTTTTGATGCTTTTGTCAGTGTACTGGGTTTGTTACAGAAGGAGAAAG
            Consensus     (913) TTTTTGATGCTTTTGTCAGTGTACTGGGTTTGTTACAGAAGGAGAAAG
                                                                        Section 21
                          (961) 961       970            980            990                  1008
10-679,561 SEQ ID NO: 1   (961) TGGCAGTTGAAGCATTTCAGATTTGCTGCCTTCTCCTACCTCCTGAAA
       AX878198 (Ota)     (961) TGGCAGTTGAAGCATTTCAGATTTGCTGCCTTCTCCTACCTCCTGAAA
            Consensus     (961) TGGCAGTTGAAGCATTTCAGATTTGCTGCCTTCTCCTACCTCCTGAAA
                                                                        Section 22
                         (1009) 1009          1020           1030           1040              1056
10-679,561 SEQ ID NO: 1  (1009) ATAGGAGAAAGTTACAGCTATTGATGAGGATGATGGCAAGGATTTGCT
       AX878198 (Ota)    (1009) ATAGGAGAAAGTTACAGCTATTGATGAGGATGATGGCAAGGATTTGCT
            Consensus    (1009) ATAGGAGAAAGTTACAGCTATTGATGAGGATGATGGCAAGGATTTGCT
                                                                        Section 23
                         (1057) 1057           1070           1080           1090              1104
10-679,561 SEQ ID NO: 1  (1057) TAAACAAAGAGATGCCACCCCTGTGTGATGGCTTTGGTACCCGAACAC
       AX878198 (Ota)    (1057) TAAACAAAGAGATGCCACCCCTGTGTGATGGCTTTGGTACCCGAACAC
            Consensus    (1057) TAAACAAAGAGATGCCACCCCTGTGTGATGGCTTTGGTACCCGAACAC
                                                                        Section 24
                         (1105) 1105 1110           1120           1130           1140         1152
10-679,561 SEQ ID NO: 1  (1105) TGATGGTTCAGACATTTTCCCGTTGCATCTTGTGTTCCAAGGATGAAG
       AX878198 (Ota)    (1105) TGATGGTTCAGACATTTTCCCGTTGCATCTTGTGTTCCAAGGATGAAG
            Consensus    (1105) TGATGGTTCAGACATTTTCCCGTTGCATCTTGTGTTCCAAGGATGAAG
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                                                              Section 25
                          (1153) 1153   1160      1170      1180      1190      1200
  10-679,561 SEQ ID NO: 1 (1153) TGGACTTGGATGAGTTATTAGCTGCTAAATTGGTAACGTTTCTGATGG
        AX878198 (Ota) (1153) TGGACTTGGATGAGTTATTAGCTGCTAGATTGGTAACGTTTCTGATGG
             Consensus (1153) TGGACTTGGATGAGTTATTAGCTGCTA ATTGGTAACGTTTCTGATGG
                                                              Section 26
                          (1201) 1201     1210      1220      1230                1248
  10-679,561 SEQ ID NO: 1 (1201) ACAATTACCAGGAAATTCTGAAAGTCCCTTTGGCCTTGCAGACCTCTA
        AX878198 (Ota) (1201) ATAATTACCAGGAAATTCTGAAAGTCCCTTTGGCCTTGCAGACCCCTA
             Consensus (1201) A AATTACCAGGAAATTCTGAAAGTCCCTTTGGCCTTGCAGACC CTA
                                                              Section 27
                          (1249) 1249       1260      1270      1280              1296
  10-679,561 SEQ ID NO: 1 (1249) TAGAGGAGCGTGTGGCTCATCTACGAAGAGTCCAGATAAAATACCCAG
        AX878198 (Ota) (1249) TAGAGGAGCGTGTGGCTCATCTACGAAGAGTCCAGATAAAATACCCAG
             Consensus (1249) TAGAGGAGCGTGTGGCTCATCTACGAAGAGTCCAGATAAAATACCCAG
                                                              Section 28
                          (1297) 1297         1310      1320      1330            1344
  10-679,561 SEQ ID NO: 1 (1297) GAGCTGATATGGATATCACTTTATCTGCTCCATCATTTTGCCGTCAAA
        AX878198 (Ota) (1297) GAGCTGATATGGATATCACTTTATCTGCTCCATCATTTTGCCGTCAAA
             Consensus (1297) GAGCTGATATGGATATCACTTTATCTGCTCCATCATTTTGCCGTCAAA
                                                              Section 29
                          (1345) 1345 1350      1360      1370      1380          1392
  10-679,561 SEQ ID NO: 1 (1345) TTAGTCCAGAGGAATTTGAATATCAAAGATCATATGGCTCTCAGGAAC
        AX878198 (Ota) (1345) TTAGTCCAGAGGAATTTGAATATCAAAGATCATATGGCTCTCAGGAAC
             Consensus (1345) TTAGTCCAGAGGAATTTGAATATCAAAGATCATATGGCTCTCAGGAAC
                                                              Section 30
                          (1393) 1393   1400      1410      1420      1430      1440
  10-679,561 SEQ ID NO: 1 (1393) CTCTGGCAGCCTTGTTGGAGGAAGTCATAACAGATGCCAAACTCTCCA
        AX878198 (Ota) (1393) CTCTGGCAGCCTTGTTGGAGGAAGTCATAACAGATGCCAAACTCTCCA
             Consensus (1393) CTCTGGCAGCCTTGTTGGAGGAAGTCATAACAGATGCCAAACTCTCCA
                                                              Section 31
                          (1441) 1441     1450      1460      1470                1488
  10-679,561 SEQ ID NO: 1 (1441) ACAAAGAGAAAAAGAAGAAACTGAAGCAGTTTCAGAAATCCTATCCTG
        AX878198 (Ota) (1441) ACAAAG------------------------------------------
             Consensus (1441) ACAAAG
                                                              Section 32
                          (1489) 1489       1500      1510      1520              1536
  10-679,561 SEQ ID NO: 1 (1489) AAGTCTATCAAGAACGATTTCCTACACCAGAAAGTGCAGCACTTCTGT
        AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (1489)
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                                                                      Section 33
                          (1537) 1537           1550      1560      1570        1584
10-679,561 SEQ ID NO: 1 (1537) TTCCTGAAAAACCCAAACCGAAACCACAGCTGCTAATGTGGGCACTAA
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1537)
                                                                      Section 34
                          (1585) 1585 1590      1600      1610      1620        1632
10-679,561 SEQ ID NO: 1 (1585) AGAAGCCTTTCCAACCATTTCAAAGAACTAGAAGTTTTCGAATGTAAT
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1585)
                                                                      Section 35
                          (1633) 1633  1640      1650      1660      1670       1680
10-679,561 SEQ ID NO: 1 (1633) AATACTTCCACAGCAACAGGTGCTAGAGACCACTGTTGTTGTTTTGAG
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1633)
                                                                      Section 36
                          (1681) 1681     1690      1700      1710              1728
10-679,561 SEQ ID NO: 1 (1681) TGAATGGTGGTTAGGAGAAAGACTTTGGTGGTGGAAGAAAGAAAAGCA
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1681)
                                                                      Section 37
                          (1729) 1729       1740      1750      1760            1776
10-679,561 SEQ ID NO: 1 (1729) TAAAACAAAGACTACTGAAATATAGATAAAGATTGCCTTAGTTTTTAA
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1729)
                                                                      Section 38
                          (1777) 1777         1790      1800      1810          1824
10-679,561 SEQ ID NO: 1 (1777) AAATGTTTGGCCATTAGTATTTTTATAAAACTCAATGCTAGTTTTAAG
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1777)
                                                                      Section 39
                          (1825) 1825 1830      1840      1850      1860        1872
10-679,561 SEQ ID NO: 1 (1825) TGTATAAATTGGTTAAAATTTATGAGTCAAATATATAGTGATAATGTT
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1825)
                                                                      Section 40
                          (1873) 1873  1880      1890      1900      1910       1920
10-679,561 SEQ ID NO: 1 (1873) AACATGTTTGTAATTGCTACAGAATTTAAGGGTATTTTTATCTCTGTG
          AX878198 (Ota) (1447) ------------------------------------------------
               Consensus (1873)
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                                                                   Section 41
                      (1921) 1921     1930      1940      1950            1968
10-679,561 SEQ ID NO: 1 (1921) CTTTCTTTTTCATGGTGTTTATTAAATAATTGTGTATATACATCCTAG
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (1921)
                                                                   Section 42
                      (1969) 1969       1980      1990      2000            2016
10-679,561 SEQ ID NO: 1 (1969) CTACTGATATCTTTATTATAGCCTTAAGACTTAATTTTAAGTCTTAAA
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (1969)
                                                                   Section 43
                      (2017) 2017         2030      2040      2050          2064
10-679,561 SEQ ID NO: 1 (2017) AATAGCGTGTATACTTGAATAAGAAAGACACTGGGTACTGTTACTGTG
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (2017)
                                                                   Section 44
                      (2065) 2065 2070      2080      2090      2100        2112
10-679,561 SEQ ID NO: 1 (2065) ATGCTATTGACTTAGTAGCCAATTATCATTTCTCCTGTATAAATTCCA
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (2065)
                                                                   Section 45
                      (2113) 2113   2120      2130      2140      2150      2160
10-679,561 SEQ ID NO: 1 (2113) GTTTTTATTGCTGCACATAAATTTTTTAATGTCTTATATTGTGATAGC
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (2113)
                                                                   Section 46
                      (2161) 2161     2170      2180      2190            2208
10-679,561 SEQ ID NO: 1 (2161) TATGTCTTTTATTGCAGATTTATTGGATGTTATGACAGATTTTACTAA
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (2161)
                                                                   Section 47
                      (2209) 2209       2220      2230      2240            2256
10-679,561 SEQ ID NO: 1 (2209) AGCTAGTGTTTTTATAACATATATATTAGTTGATGTTTACCTATAAGT
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (2209)
                                                                   Section 48
                      (2257) 2257         2270      2280      2290          2304
10-679,561 SEQ ID NO: 1 (2257) GGAGTAGATTTTCATCTGCCTGCAATGGTATAATTTCAGTCTTAGCTA
       AX878198 (Ota) (1447) ------------------------------------------------
             Consensus (2257)
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                                                                         Section 49
                           (2305) 2305 2310       2320       2330       2340        2352
10-679,561 SEQ ID NO: 1 (2305) AAAATGGAAAGTTGAACTGGATAAATTCTTTGGGTACCCTTAGACCTC
       AX878198 (Ota) (1447) ------------------------------------------------
            Consensus (2305)
                                                                         Section 50
                           (2353) 2353    2360       2370       2380       2390      2400
10-679,561 SEQ ID NO: 1 (2353) TGATTCTAAGTCAAATGCAAATGGGTTAAATAAAATGAGACTACTTCC
       AX878198 (Ota) (1447) ------------------------------------------------
            Consensus (2353)
                                                                         Section 51
                           (2401) 2401     2410       2420       2430                 2448
10-679,561 SEQ ID NO: 1 (2401) TTTATAAATATATTTTCATCCTTTTGAAAGTAAGTGAAATGTAAATAA
       AX878198 (Ota) (1447) ------------------------------------------------
            Consensus (2401)
                                                                         Section 52
                           (2449) 2449              2468
10-679,561 SEQ ID NO: 1 (2449) ACTTATTTTTTTTAAAAATG
       AX878198 (Ota) (1447) --------------------
            Consensus (2449)
```

Alignment 2.APR

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                                                                                   Section 1
                                (1) 1         10        20        30               48
10-679,561 SEQ ID NO: 1         (1) ATCAGCGCTGGCGCGGCTGCGGCCGCTGCTGCCTACGCGCCATGGAGC
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus          (1)
                                                                                   Section 2
                               (49) 49         60        70        80              96
10-679,561 SEQ ID NO: 1        (49) ATCGCATCGTGGGGCCCGGGCCGTACCGAGCTACCAGGCTGTGGAATG
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus         (49)
                                                                                   Section 3
                               (97) 97           110       120       130           144
10-679,561 SEQ ID NO: 1        (97) AGACCGTGGAGCTTTTTCGTGCTAAGATGCCGTTACGGAAACATCGCT
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus         (97)
                                                                                   Section 4
                              (145) 145  150       160       170       180         192
10-679,561 SEQ ID NO: 1       (145) GTCGTTTCAAGAGCTATGAGCATTGTTTCACAGCGGCCGAAGCTGTGG
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus        (145)
                                                                                   Section 5
                              (193) 193    200       210       220       230       240
10-679,561 SEQ ID NO: 1       (193) ATTGGCTGCATGAGCTGCTGAGGTGCAGTCAAAACTTCGGCCCTGAAG
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus        (193)
                                                                                   Section 6
                              (241) 241       250       260       270              288
10-679,561 SEQ ID NO: 1       (241) TGACCCGCAAACAAACGGTCCAGCTGCTAAAAAAATTCCTGAAGAATC
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus        (241)
                                                                                   Section 7
                              (289) 289         300       310       320            336
10-679,561 SEQ ID NO: 1       (289) ACGTTATTGAAGACATCAAGGGAAAATGGGGTGAGGAAGATTTTGAAG
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus        (289)
                                                                                   Section 8
                              (337) 337          350       360       370           384
10-679,561 SEQ ID NO: 1       (337) ACAATCGTCACTTATACAGATTTCCTCCTTCTTCACCCCTGAAACCAT
     AAA00789 Williams          (1) ------------------------------------------------
             Consensus        (337)
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                                                                    Section 9
                         (385) 385  390              400             410            420            432
10-679,561 SEQ ID NO: 1  (385) ATCCAAAGAAGCCCCCAAACCAAAAGGATGTTATTAAATTTCCAGAAT
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (385)
                                                                    Section 10
                         (433) 433    440            450            460            470            480
10-679,561 SEQ ID NO: 1  (433) GGAATGATCTCCCACCAGGCACTTCACAAGAGAACATCCCAGTGAGGC
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (433)
                                                                    Section 11
                         (481) 481        490            500            510                       528
10-679,561 SEQ ID NO: 1  (481) CAGTTGTGATGAATTCTGAGATGTGGTACAAGCGTCACAGTATTGCAA
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (481)
                                                                    Section 12
                         (529) 529            540            550            560                   576
10-679,561 SEQ ID NO: 1  (529) TTGGAGAGGTGCCAGCTTGCCGTCTTGTCCACCGCAGACAGCTGACAG
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (529)
                                                                    Section 13
                         (577) 577                 590            600            610              624
10-679,561 SEQ ID NO: 1  (577) AGGCCAATGTAGAAGAGATATGGAAGTCTATGACATTATCATACTTAC
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (577)
                                                                    Section 14
                         (625) 625  630              640            650            660            672
10-679,561 SEQ ID NO: 1  (625) AGAAAATTCTTGGCCTGGATTCCTTAGAAGAAGTTTTAGACGTCAAAC
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (625)
                                                                    Section 15
                         (673) 673    680            690            700            710            720
10-679,561 SEQ ID NO: 1  (673) TTGTCAATTCGAAGTTCATCATCCATAATGTATATAGTGTTAGCAAGC
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (673)
                                                                    Section 16
                         (721) 721        730            740            750                       768
10-679,561 SEQ ID NO: 1  (721) AGGGAGTTGTTATTCTTGATGACAAGTCAAAAGAACTTCCTCATTGGG
     AAA00789 Williams     (1) ------------------------------------------------
             Consensus   (721)
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                                                                    Section 17
                              (769) 769        780       790       800        816
     10-679,561 SEQ ID NO: 1  (769) TGCTGTCAGCTATGAAGTGTTTGGCAAATTGGCCCAACTGTTCTGATT
            AAA00789 Williams   (1) ------------------------------------------------
                    Consensus (769)
                                                                    Section 18
                              (817) 817          830       840       850        864
     10-679,561 SEQ ID NO: 1  (817) TGAAGCAGCCTATGTACTTGGGATTTGAAAAAGATGTCTGTAAAACCA
            AAA00789 Williams   (1) ------------------------------------------------
                    Consensus (817)
                                                                    Section 19
                              (865) 865  870       880       890       900      912
     10-679,561 SEQ ID NO: 1  (865) TAGCTGATTACTATGGTCACTTGAAAGAGCCTCTACTTACATTTCATC
            AAA00789 Williams   (1) ------------------------------------------------
                    Consensus (865)
                                                                    Section 20
                              (913) 913    920       930       940       950    960
     10-679,561 SEQ ID NO: 1  (913) TTTTTGATGCTTTTGTCAGTGTACTGGGTTTGTTACAGAAGGAGAAAG
            AAA00789 Williams   (1) -----------NNNNNNNNNNNNGTCGGTTTGTTACAGAAGGAGAAAG
                    Consensus (913)                         T GGTTTGTTACAGAAGGAGAAAG
                                                                    Section 21
                              (961) 961      970       980       990            1008
     10-679,561 SEQ ID NO: 1  (961) TGGCAGTTGAAGCATTTCAGATTTGCTGCCTTCTCCTACCTCCTGAAA
            AAA00789 Williams  (38) TGGCAGTTGAAGCATTTCAGATTTGCTGCCTTCTCCTACCTCCTGAAA
                    Consensus (961) TGGCAGTTGAAGCATTTCAGATTTGCTGCCTTCTCCTACCTCCTGAAA
                                                                    Section 22
                             (1009) 1009       1020      1030      1040         1056
     10-679,561 SEQ ID NO: 1 (1009) ATAGGAGAAAGTTACAGCTATTGATGAGGATGATGGCAAGGATTTGCT
            AAA00789 Williams  (86) ATAGGAGAAAGTTACAGCTATTGATGAGGATGATGGCAAGGATTTGCT
                   Consensus (1009) ATAGGAGAAAGTTACAGCTATTGATGAGGATGATGGCAAGGATTTGCT
                                                                    Section 23
                             (1057) 1057         1070      1080      1090       1104
     10-679,561 SEQ ID NO: 1 (1057) TAAACAAAGAGATGCCACCCCTGTGTGATGGCTTTGGTACCCGAACAC
            AAA00789 Williams (134) TAAACAAAGAGATGCCACCCCTGTGTGATGGCTTTGGTACCCGAACAC
                   Consensus (1057) TAAACAAAGAGATGCCACCCCTGTGTGATGGCTTTGGTACCCGAACAC
                                                                    Section 24
                             (1105) 1105 1110      1120      1130      1140     1152
     10-679,561 SEQ ID NO: 1 (1105) TGATGGTTCAGACATTTTCCCGTTGCATCTTGTGTTCCAAGGATGAAG
            AAA00789 Williams (182) TGATGGTTCAGACATTTTCCCGTTGCATCTTGTGTTCCAAGGATGAAG
                   Consensus (1105) TGATGGTTCAGACATTTTCCCGTTGCATCTTGTGTTCCAAGGATGAAG
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                                                                     Section 25
                         (1153) 1153   1160      1170      1180      1190   1200
10-679,561 SEQ ID NO: 1 (1153) TGGACTTGGATGAGTTATTAGCTGCTAAATTGGTAAC-GTTTCTGATG
      AAA00789 Williams  (230) TGGACTTGGATGAGTTATTAGCTGCTAGATTGGTAACCGTTTCTGATG
             Consensus (1153) TGGACTTGGATGAGTTATTAGCTGCTA ATTGGTAAC GTTTCTGATG
                                                                     Section 26
                         (1201) 1201     1210      1220      1230           1248
10-679,561 SEQ ID NO: 1 (1200) GACAATTACCAGGAAATTCTGAAAGTCCCTTTGGCCTTGCAGACCTCT
      AAA00789 Williams  (278) GACAATTACCAGGAAATTCTGNN-------------------------
             Consensus (1201) GACAATTACCAGGAAATTCTG
                                                                     Section 27
                         (1249) 1249       1260      1270      1280         1296
10-679,561 SEQ ID NO: 1 (1248) ATAGAGGAGCGTGTGGCTCATCTACGAAGAGTCCAGATAAAATACCCA
      AAA00789 Williams  (301) ------------------------------------------------
             Consensus (1249)
                                                                     Section 28
                         (1297) 1297         1310      1320      1330       1344
10-679,561 SEQ ID NO: 1 (1296) GGAGCTGATATGGATATCACTTTATCTGCTCCATCATTTTGCCGTCAA
      AAA00789 Williams  (301) ------------------------------------------------
             Consensus (1297)
                                                                     Section 29
                         (1345) 1345 1350      1360      1370      1380     1392
10-679,561 SEQ ID NO: 1 (1344) ATTAGTCCAGAGGAATTTGAATATCAAAGATCATATGGCTCTCAGGAA
      AAA00789 Williams  (301) ------------------------------------------------
             Consensus (1345)
                                                                     Section 30
                         (1393) 1393   1400      1410      1420      1430   1440
10-679,561 SEQ ID NO: 1 (1392) CCTCTGGCAGCCTTGTTGGAGGAAGTCATAACAGATGCCAAACTCTCC
      AAA00789 Williams  (301) ------------------------------------------------
             Consensus (1393)
                                                                     Section 31
                         (1441) 1441     1450      1460      1470           1488
10-679,561 SEQ ID NO: 1 (1440) AACAAAGAGAAAAAGAAGAAACTGAAGCAGTTTCAGAAATCCTATCCT
      AAA00789 Williams  (301) ------------------------------------------------
             Consensus (1441)
                                                                     Section 32
                         (1489) 1489       1500      1510      1520         1536
10-679,561 SEQ ID NO: 1 (1488) GAAGTCTATCAAGAACGATTTCCTACACCAGAAAGTGCAGCACTTCTG
      AAA00789 Williams  (301) ------------------------------------------------
             Consensus (1489)
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                                                                              Section 33
                          (1537) 1537           1550          1560          1570            1584
10-679,561 SEQ ID NO: 1 (1536) TTTCCTGAAAAACCCAAACCGAAACCACAGCTGCTAATGTGGGCACTA
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1537)
                                                                              Section 34
                          (1585) 1585 1590          1600          1610          1620        1632
10-679,561 SEQ ID NO: 1 (1584) AAGAAGCCTTTCCAACCATTTCAAAGAACTAGAAGTTTTCGAATGTAA
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1585)
                                                                              Section 35
                          (1633) 1633  1640          1650          1660          1670      1680
10-679,561 SEQ ID NO: 1 (1632) TAATACTTCCACAGCAACAGGTGCTAGAGACCACTGTTGTTGTTTTGA
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1633)
                                                                              Section 36
                          (1681) 1681      1690          1700          1710                1728
10-679,561 SEQ ID NO: 1 (1680) GTGAATGGTGGTTAGGAGAAAGACTTTGGTGGTGGAAGAAAGAAAAGC
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1681)
                                                                              Section 37
                          (1729) 1729         1740          1750          1760              1776
10-679,561 SEQ ID NO: 1 (1728) ATAAAACAAAGACTACTGAAATATAGATAAAGATTGCCTTAGTTTTTA
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1729)
                                                                              Section 38
                          (1777) 1777            1790          1800          1810         1824
10-679,561 SEQ ID NO: 1 (1776) AAAATGTTTGGCCATTAGTATTTTTATAAAACTCAATGCTAGTTTTAA
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1777)
                                                                              Section 39
                          (1825) 1825 1830          1840          1850          1860        1872
10-679,561 SEQ ID NO: 1 (1824) GTGTATAAATTGGTTAAAATTTATGAGTCAAATATATAGTGATAATGT
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1825)
                                                                              Section 40
                          (1873) 1873  1880          1890          1900          1910      1920
10-679,561 SEQ ID NO: 1 (1872) TAACATGTTTGTAATTGCTACAGAATTTAAGGGTATTTTTATCTCTGT
      AAA00789 Williams  (301) ------------------------------------------------
               Consensus (1873)
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                                                                          Section 41
                       (1921) 1921      1930          1940          1950            1968
10-679,561 SEQ ID NO: 1 (1920) GCTTTCTTTTTCATGGTGTTTATTAAATAATTGTGTATATACATCCTA
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (1921)
                                                                          Section 42
                       (1969) 1969       1980          1990          2000           2016
10-679,561 SEQ ID NO: 1 (1968) GCTACTGATATCTTTATTATAGCCTTAAGACTTAATTTTAAGTCTTAA
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (1969)
                                                                          Section 43
                       (2017) 2017          2030          2040          2050          2064
10-679,561 SEQ ID NO: 1 (2016) AAATAGCGTGTATACTTGAATAAGAAAGACACTGGGTACTGTTACTGT
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (2017)
                                                                          Section 44
                       (2065) 2065  2070         2080          2090          2100      2112
10-679,561 SEQ ID NO: 1 (2064) GATGCTATTGACTTAGTAGCCAATTATCATTTCTCCTGTATAAATTCC
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (2065)
                                                                          Section 45
                       (2113) 2113    2120          2130          2140          2150   2160
10-679,561 SEQ ID NO: 1 (2112) AGTTTTTATTGCTGCACATAAATTTTTTAATGTCTTATATTGTGATAG
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (2113)
                                                                          Section 46
                       (2161) 2161      2170          2180          2190            2208
10-679,561 SEQ ID NO: 1 (2160) CTATGTCTTTTATTGCAGATTTATTGGATGTTATGACAGATTTTACTA
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (2161)
                                                                          Section 47
                       (2209) 2209          2220          2230          2240          2256
10-679,561 SEQ ID NO: 1 (2208) AAGCTAGTGTTTTTATAACATATATATTAGTTGATGTTTACCTATAAG
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (2209)
                                                                          Section 48
                       (2257) 2257          2270          2280          2290          2304
10-679,561 SEQ ID NO: 1 (2256) TGGAGTAGATTTTCATCTGCCTGCAATGGTATAATTTCAGTCTTAGCT
     AAA00789 Williams  (301) ------------------------------------------------
              Consensus (2257)
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                                                                          Section 49
                        (2305) 2305   2310          2320           2330           2340         2352
10-679,561 SEQ ID NO: 1 (2304) AAAAATGGAAAGTTGAACTGGATAAATTCTTTGGGTACCCTTAGACCT
     AAA00789 Williams   (301) ------------------------------------------------
               Consensus (2305)
                                                                          Section 50
                        (2353) 2353     2360           2370           2380           2390     2400
10-679,561 SEQ ID NO: 1 (2352) CTGATTCTAAGTCAAATGCAAATGGGTTAAATAAAATGAGACTACTTC
     AAA00789 Williams   (301) ------------------------------------------------
               Consensus (2353)
                                                                          Section 51
                        (2401) 2401          2410           2420           2430               2448
10-679,561 SEQ ID NO: 1 (2400) CTTTATAAATATATTTTCATCCTTTTGAAAGTAAGTGAAATGTAAATA
     AAA00789 Williams   (301) ------------------------------------------------
               Consensus (2401)
                                                                          Section 52
                        (2449) 2449                2469
10-679,561 SEQ ID NO: 1 (2448) AACTTATTTTTTTTAAAAATG
     AAA00789 Williams   (301) ---------------------
               Consensus (2449)
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